

1. Use the product rule to multiply: $\sqrt{3x} \cdot \sqrt{2}$

$$\sqrt{6x} \quad \checkmark$$

2. Use the quotient rule to simplify: $\sqrt{\frac{21}{100}}$

$$\frac{\sqrt{21}}{10} \quad \checkmark$$

3. Use the quotient rule to simplify: $\sqrt[2]{\frac{2x^2}{49y^8}}$

$$\frac{\sqrt{2}}{7y^4} \quad \checkmark$$

4. Use the quotient rule to divide. Then simplify if possible.

$$\frac{\sqrt[3]{250a^7}}{\sqrt[3]{2a}}$$

$$\sqrt[3]{\frac{125a^6}{2a}}$$

$$\rightarrow 3 \times 5a^2$$

$$15a^2 \checkmark$$

5. Subtract the following radicals: $10\sqrt{75} - 2\sqrt{28} - 2\sqrt{27}$

$$\begin{array}{ccc} \sqrt{25} \sqrt{3} & \sqrt{4} \sqrt{7} & \sqrt{9} \sqrt{3} \\ \downarrow & \downarrow & \downarrow \\ 5 & 2 & 3 \end{array}$$

$$\underline{50\sqrt{3}} - 4\sqrt{7} - \underline{6\sqrt{3}}$$

$$44\sqrt{3} - 4\sqrt{7} \quad \checkmark$$

6. Multiply. Assume that all variables represent positive real numbers: $(7\sqrt{x} - 7)(6\sqrt{x} - 4)$

$$\begin{array}{r} 42\boxed{\sqrt{x^2}} - 28\sqrt{x} - 42\sqrt{x} + 28 \\ \hline 42x - 70\sqrt{x} + 28 \end{array}$$

✓

7. Rationalize the denominator and simplify: $\frac{2\sqrt{3}}{\sqrt{7}} \frac{\sqrt{7}}{\sqrt{7}} = \frac{2\sqrt{21}}{\sqrt{49}} = \frac{2\sqrt{21}}{7}$

✓

8. Rationalize the denominator and simplify: $\frac{2}{5-\sqrt{10}}$

$$\frac{5+\sqrt{10}}{5+\sqrt{10}}$$

Top

$$2(3+\sqrt{10})$$

$$10+2\sqrt{10}$$

✓

Bot 10

$$(5-\sqrt{10})(5+\sqrt{10})$$

$$25 + \cancel{5\sqrt{10}} - \cancel{5\sqrt{10}} - \sqrt{100}$$

$$25 - 10$$

$$15$$

✓

$$\frac{10+2\sqrt{10}}{15}$$

9. Solve the radical equation: $\sqrt{4x-3} = 5$

$$4x-3 = 25$$

$$\begin{array}{r} +3 \quad +3 \\ \hline 4x = 28 \\ \frac{4x}{4} = \frac{28}{4} \end{array}$$

$$x = 7$$

10. Solve the radical equation: $\sqrt{5x-4} - 2 = 2$

$$\begin{array}{r} +2 \quad +2 \\ \hline \sqrt{5x-4} = 4 \end{array}$$

$$5x-4 = 16$$

$$\begin{array}{r} +4 \quad +4 \\ \hline 5x = 20 \\ \frac{5x}{5} = \frac{20}{5} \end{array}$$

$$x = 4$$

11. Solve the radical equation: $\sqrt{11-x} = (x+1)(x+1)$

$$11-x = x^2 + 1/x + x + 1$$

$$11-x = x^2 + 2x + 1$$

$$\begin{array}{r} -11 + 1/x \quad \quad +1/x \quad -11 \\ \hline \end{array}$$

$$x^2 + 3x - 10 = 0$$

$$(x+5)(x-2)$$

$$x = -5$$

$$x = 2$$



12. Find the length of the unknown side of the triangle. State your answer in both simplified radical form as well as decimal form correct to two decimal places.

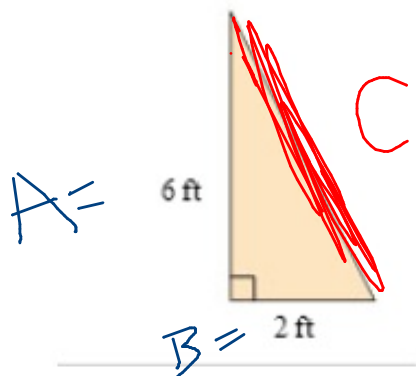
$$A^2 + B^2 = \underline{C}^2$$

$$6^2 + 2^2$$

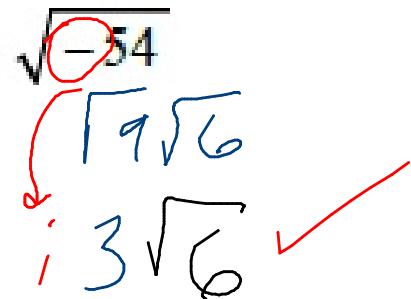
$$36 + 4 = \sqrt{40}$$

$$\sqrt{40}$$

$$\boxed{2\sqrt{10}}$$



13. Simplify, using i notation as needed: $\sqrt{-54}$

$$i 3\sqrt{6}$$


14. Add and write answer in $a+bi$ form: $(2-8i) + (9+5i)$

$$11 - 3i$$


15. Multiply and write answer in a+bi form: $5i(3-4i)$

$$15i - 20 \boxed{i^2} \text{ change sign}$$

(-1)

$$\boxed{20 + 15i} \checkmark$$

16. Multiply and write answer in a+bi form: $2i(5-8i)$

$$\cancel{10} 10i - 16 \boxed{i^2}$$

$$\boxed{16 + 10i} \checkmark$$

17. Multiply and write answer in $a+bi$ form: $(2-5i)^2(2-5i)$

$$\textcircled{4} \quad \underline{-10i} - \underline{10i} + 25 \textcircled{i^2}$$

$\textcircled{-25}$

$$\boxed{-21-20i} \quad \checkmark$$

18. Solve using the quadratic formula: $x^2 + 5 = 6x$

$$\begin{array}{r} -6x \quad -6x \\ \hline \end{array}$$

$$x^2 - 6x + 5$$

$$A=1 \quad B=-6 \quad C=5$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{6 \pm \sqrt{(-6)^2 - 4(1)(5)}}{2(1)} = \frac{6 \pm \sqrt{36 - 20}}{2} = \frac{6 \pm \sqrt{16}}{2} = \frac{6 \pm 4}{2}$$

$$\frac{6 \pm 4}{2} = 3 \pm 2 \quad \begin{array}{l} \nearrow 3+2=5 \checkmark \\ \searrow 3-2=1 \checkmark \end{array}$$

19. Solve using the quadratic formula: $x^2 - 6x + 13 = 0$

$$A=1 \quad B=-6 \quad C=13$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{6 \pm \sqrt{(-6)^2 - 4(1)(13)}}{2(1)}$$

$$\frac{6 \pm \sqrt{36 - 52}}{2} = \frac{6 \pm \sqrt{-16}}{2} = \frac{6 \pm 4i}{2}$$

$$\frac{6 \pm 4i}{2} = \boxed{3 \pm 2i}$$

20. Solve using the quadratic formula: $2x^2 + 7x - 4 = 0$

A B C

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

~~$-b \pm \sqrt{b^2 - 4ac}$~~

$$\frac{-7 \pm \sqrt{7^2 - 4(2)(-4)}}{2(2)} = \frac{-7 \pm \sqrt{49 + 32} = \sqrt{81} = 9}{4}$$

$$\frac{-7 + 9}{4} \rightarrow \frac{-7 + 9}{4} = \frac{2}{4} = \left(\frac{1}{2}\right) \checkmark$$

$$\frac{-7 - 9}{4} \rightarrow \frac{-7 - 9}{4} = \frac{-16}{4} = \boxed{-4} \checkmark$$

21. Solve using the quadratic formula: $(x+4)(x+2)=7$

$$x^2 + 2x + 4x + 8 = 7$$

$$\quad \quad \quad -7 \quad -7$$

$$x^2 + 6x + 1$$

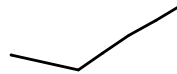
$$\begin{matrix} 4\sqrt{2} \\ \sqrt{16} \sqrt{2} \end{matrix}$$

$$\frac{-6 \pm \sqrt{6^2 - 4(1)(1)}}{2(1)} = \frac{-6 \pm \sqrt{36 - 4}}{2} = \frac{-6 \pm \sqrt{32}}{2}$$

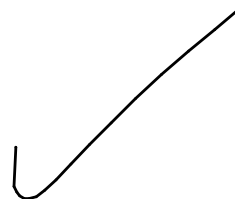
$$\frac{-\cancel{6} \pm \cancel{4}\sqrt{2}}{\cancel{2}} = \boxed{-3 \pm 2\sqrt{2}}$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$



A photograph of a person's arm with a tattoo of the quadratic formula. The tattoo is in a dark, slightly faded ink. The formula is written as x = (-b ± √(b² - 4ac)) / 2a. The 'x' is on the left, followed by an equals sign, then the numerator in a large fraction bar, and the denominator 2a below it.
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$



22. Find the vertex of the graph of this quadratic function: $f(x) = x^2 + 2x - 8$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-b}{2a}$$

A B 2
Vertex

$$\frac{-2}{2(1)} = \frac{-2}{2} = \boxed{-1} \checkmark$$

$$(-1)^2 + 2(-1) - 8$$

$$1 - 2 - 8 = \boxed{-9} \checkmark$$